

PARARCHAEA FORSTER

Pararchaea Forster, 1955, p. 397 (type species by original designation *Pararchaea alba* Forster).

DISCUSSION: The first species recorded, from New Zealand, was placed in the mecysmaucheniid genus *Zearchaea*, as *Z. rubra*, by Forster (1949). It was not until six years later, when more abundant material was available for study from both Australia and New Zealand, that a separate genus *Pararchaea* was established by Forster (1955). At that time little was known of the female internal genitalia; the fact that the true mecysmaucheniids are haplogyne was not recognized and hence the association of this genus with the mecysmaucheniids was not questioned. In that paper two further species were described, one from New Zealand (*P. alba*) and the other from Queensland, Australia (*P. binnaburra*). Subsequently, Hickman (1969) described four more species from Tasmania (*P. corticola*, *P. ornata*, *P. saxicola*, and *P. bryophila*).

With the separation of the true archaeids from the mecysmaucheniids by other workers and the realization that neither *Pararchaea* nor *Holarchaea* could be directly associated with either of those taxa, it became obvious that an alternative home was required for them. Despite the undesirability of establishing family taxa for single genera, it is evident that as with other relict taxa (e.g., the "hypochiloid" families) there is no other alternative short of lumping the entire range of taxa into a single family Archaeidae.

HOLARCHAEIDAE, NEW FAMILY

Figures 239–259

TYPE GENUS: *Holarchaea* Forster.

DIAGNOSIS: Holarchaeids can be distinguished from all other spiders by having chelicerae originating from a foramen in the carapace that is outlined ventrally only by unsclerotized cuticle; the minute size, the absence of cheliceral peg teeth, and the apparent absence of a poison gland also readily distinguish holarchaeids from true archaeids, mecysmaucheniids, and pararchaeids.

DESCRIPTION: Minute (0.8–1.5 mm.) ecribellate, entelegyne, araneomorph spiders (fig.

239). Eight eyes, relatively large; AME smallest, others subequal; laterals contiguous, clearly separated from medians (fig. 240); medians separated from each other. Carapace with pars cephalica raised high above pars thoracica but not constricted to form neck (fig. 240); anterior margin extending down each side of chelicerae, connected ventrally by unsclerotized cuticle that completes the encirclement of bases of chelicerae so that those structures are enclosed in oval foramen (fig. 242); surface of carapace finely punctate or reticulate. Anterior portion of carapace between eyes and chelicerae strongly swollen to form distinct ridge projecting over base of chelicerae (fig. 241); cheliceral foramen without triangular sclerite ventrally between chelicerae. Chelicerae (figs. 250, 251) long, slender, fang long, at least one-third length of paturon (Hickman, 1981, records that in *H. globosa* the fang is only slightly shorter than the paturon), without stridulatory ridges or lateral boss; furrow only weakly defined, promargin with two or three small, slender teeth, without peg teeth; cheliceral gland mound well developed, situated near fang tip (fig. 250), with few pores, usually associated with single tooth; fang divided at one-third its length by transverse groove, narrowing distally to sharp point bent down toward cheliceral furrow. No opening on fang for poison gland, which is therefore presumed absent. Endites longer than wide, directed across labium, not meeting at midline (fig. 258); serrula well developed as single row of strong teeth (fig. 259); labium strongly rebordered (fig. 258). Labrum without lateral protuberances. Sternum scutiform, longer than wide, widely obtuse posteriorly; coxae IV separated by almost twice their width (fig. 258).

Abdomen globose, without surface swellings or scuta (fig. 239); cuticle thin. Abdominal hairs short, weakly serrate. Six well-developed spinnerets with very few spigots; anteriors strongest, subcontiguous (fig. 257); colulus distinct, linguiform, with two hairs (fig. 257). Female genitalia with single opening shortly anterior of epigastric furrow, leading into pair of spherical, sclerotized receptacula from each of which a fertilization duct extends back to bursal cavity (fig. 243).

Legs slender, clothed with smooth or weak-

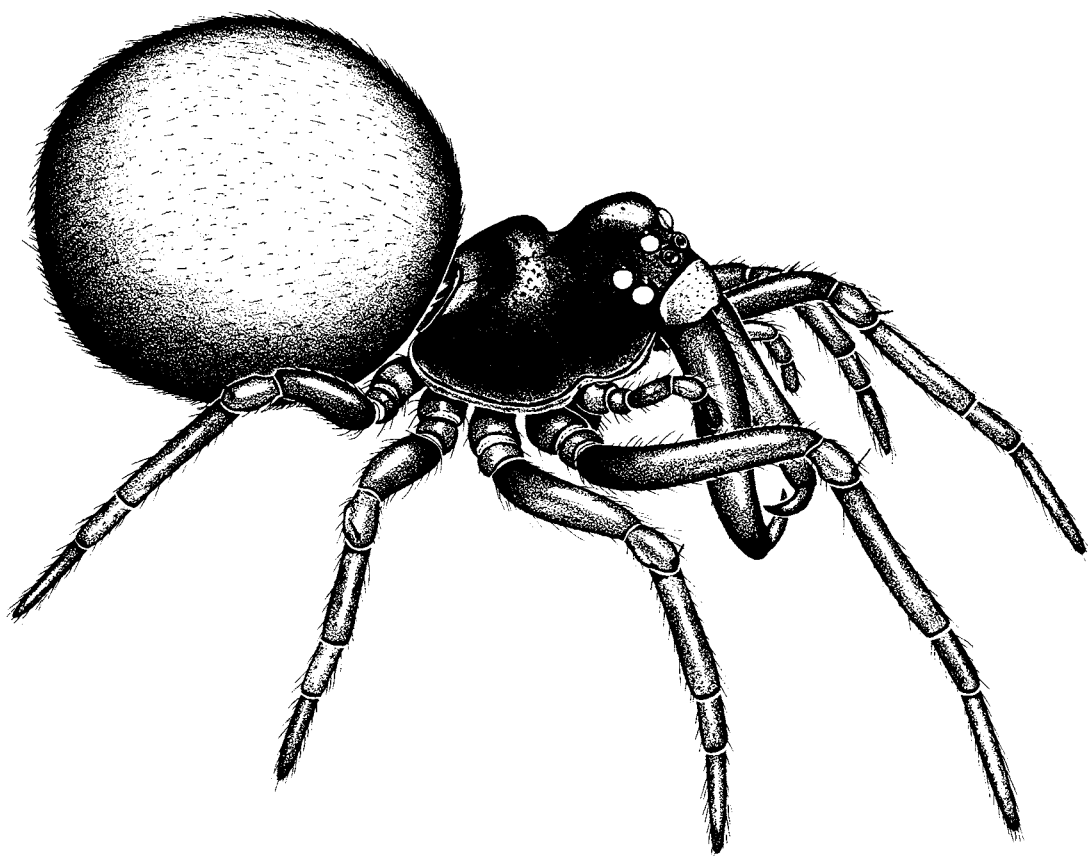


FIG. 239. Holarchaeidae: *Holarchaea novaeseelandiae* (Forster), female.

ly serrate hairs, without spines; no scopula hairs or claw tufts present; metatarsi not elongate. Tarsi without ring of unsclerotized cuticle, those of legs I and II swollen, with group of modified hairs beyond tarsal organ (figs. 244, 245) and a number of low mounds below hairs (fig. 246); claws reduced on legs I and II; three smooth claws on legs III and IV, superiors long, slender, inferior shorter, slender (fig. 249). Single trichobothrium on metatarsi, two or three on tibiae; bothria with smooth hood (fig. 247). Tarsal organ capsulate (fig. 248). Female palp without claw, small, with tibia and tarsus partially fused. Male palp with strong, coiled embolus encircling bulb two or three times (figs. 252, 253, 255); surface within coils raised and smooth except for short lobe near base of embolus; cymbium spoon-shaped, without paracymbial or other processes, with numerous curved

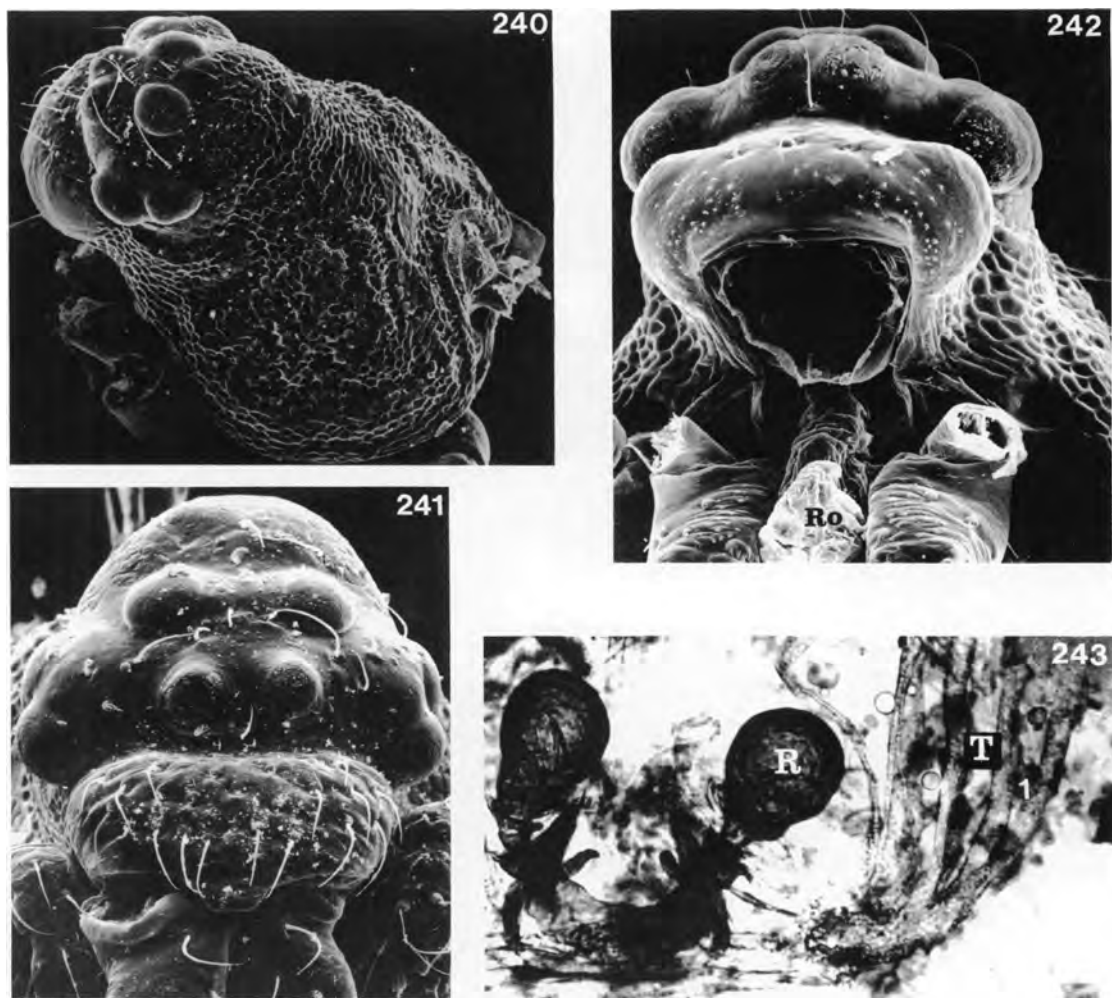
hairs (fig. 254); tibia with two spinous processes on distal retrolateral surface (fig. 256).

Number of heart ostia unknown. Respiratory system without posterior spiracle; anterior spiracles leading into short trunk from which eight or nine relatively large, thin-walled tracheal tubes extend directly forward but are limited to abdomen (fig. 243); these tracheal structures could equally well be termed reduced lamellae and represent an intermediate state such as occurs in some Anapidae (Forster, 1959), where the transformation from booklung system into tracheae remains incomplete.

INCLUDED GENERA: Only the type genus.

DISTRIBUTION: New Zealand and Tasmania.

DISCUSSION: Because the holarchaeids are so small and are so rarely found in numbers, it was not possible to be certain of a number

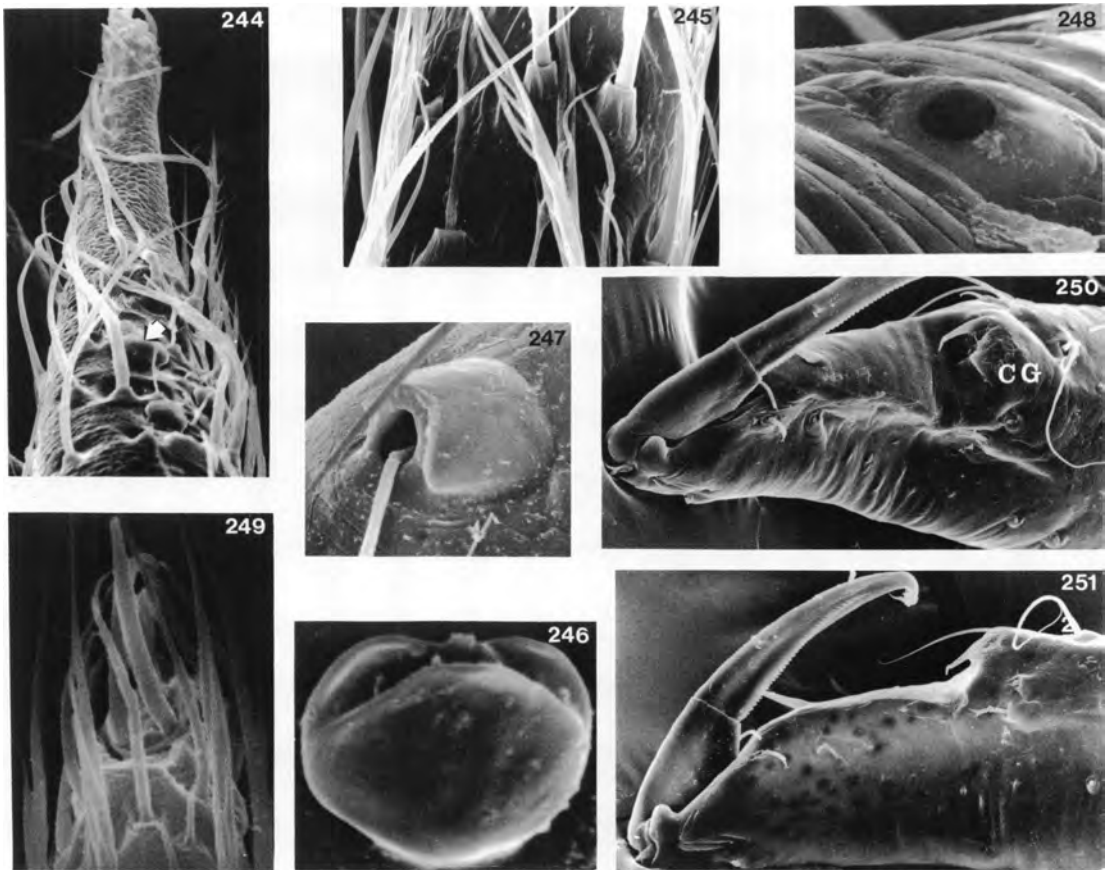


FIGS. 240–243. *Holarchaea novaeseelandiae* (Forster). 240. Lateral view of carapace, showing the reticulate cuticular sculpturing and the absence of a fovea. 241. Head and clypeus; note the swollen clypeus with a median protuberance. 242. Anterior view of carapace with chelicerae removed; note the wrinkled, lightly sclerotized cuticle between the cheliceral foramen and the labrum (Ro). 243. Anterior portion of abdomen from above (cleared); note the paired receptacula (R) and the relatively large tracheal tubes (T) which retain some of the characteristics of the original lamellae.

of characters at the time the first species was described (from New Zealand) as an *Archaea* by Forster (1949). Indeed it is only recently, with the development of new techniques for internal examination and the availability of scanning electron microscopes, that any reasonable level of certainty has been reached.

During the initial examination of cleared specimens under a light microscope it appeared that the fang lacked an opening for the passage of venom, but this observation

was not recorded at that time. Re-examination under a scanning scope, however, has also failed to demonstrate a duct aperture and it must be concluded that (along with the Uloboridae and *Heptathela*) a poison gland is absent in these spiders. Typical peg teeth are not present along the promargin but there are often two or three stout setae which could be vestigial remnants of those structures. The true teeth are also few in number and weakly developed; when these factors are linked with



FIGS. 244–251. *Holarchaeidae: Holarchaea novaeseelandiae* (Forster). 244. Distal portion of tarsus, showing the group of modified hairs associated with a number of structures of unknown function (arrow). 245. Enlargement of distal portion of modified tarsal hairs. 246. Enlargement of tarsal structure of unknown function. 247. Trichobothrium. 248. Tarsal organ. 249. Distal portion of tarsus III, showing the smooth, slender superior claws. 250, 251. Chelicera of male; note the small tooth near fang base and gland mound (CG) near fang tip.

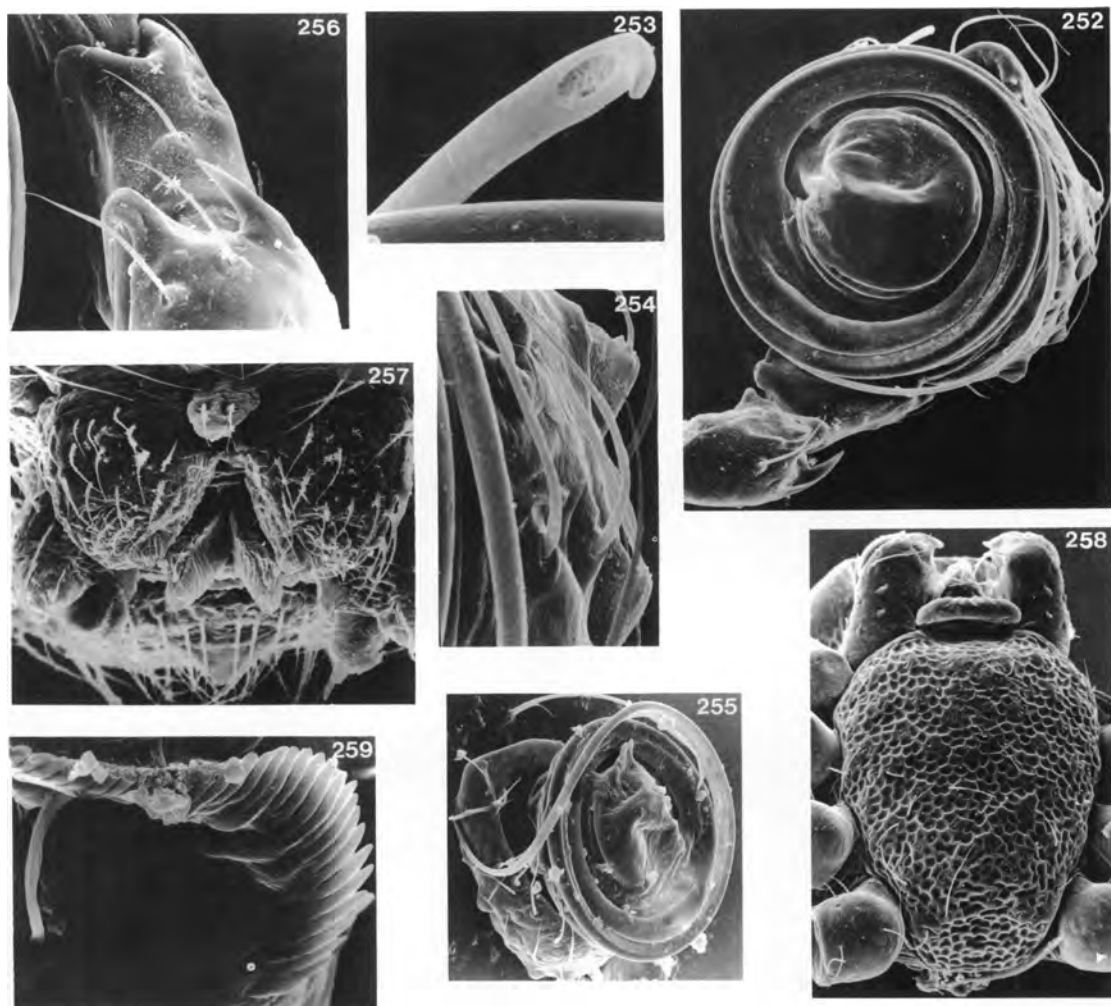
the apparent absence of venom and the tiny size of the spiders it is difficult to speculate on what prey they capture.

The absence of a posterior spiracle was noted in the original description but the respiratory system was not examined. The fact that the anterior booklungs are strongly modified and could be interpreted as a tracheal system is not unexpected in view of what we now know about the types of respiratory modifications to be found in many of the smaller spiders.

The female internal genitalia have only recently been examined and the presence of an external intromittent pore and internal fer-

tilization ducts recorded, thus establishing the genitalia as being fully entelegyne. Externally there is only a slight thickening of the epigastric region, scarcely different from that found in many haplogyne spiders.

The thickening of the tarsi of the anterior legs was also recorded earlier, along with the presence of a clump of strongly ciliate hairs. Hickman (1981) recorded a similar modification of the tarsi in the Tasmanian *H. globosa* but (being limited to low magnification) he did not see the modified setae which are probably also present. The presumed sensory organs on the surface of the tarsi between these hairs (fig. 246) are unlike any other



FIGS. 252–259. Holarchaeidae: *Holarchaea novaeseelandiae* (Forster). 252. Ventral view of male palp. 253. Tip of embolus. 254. Portion of cymbium, showing the curved hairs arising from prominent, raised bases. 255. Partly expanded bulb of male palp. 256. Patella and tibia of male palp, showing the two distal prolateral patellar processes. 257. Spinnerets and colulus. 258. Ventral surface of cephalothorax; note the strongly rebordered labium. 259. Serrula.

structures thus far recorded and are not present in other palpimanoid spiders. A similar swelling of the tarsal segment is found in some of the Pararchaeidae (e.g., *Pararchaea bryophila* Hickman), whereas modified tarsal hairs are also found in other species, such as *Pararchaea rubra* Forster. The association of these features present in *Holarchaea* is unique to this genus, however.

The form of the carapace, with its differential elevation of the head, is reminiscent of the archaeids rather than the other two re-

lated families. In all three of these families, however, the incomplete fusion of the carapace beneath the chelicerae is found only in the early instars and does not persist in adults as it does in the Holarchaeidae.

NATURAL HISTORY: These spiders are restricted to habitats which have a relatively high and constant humidity. In New Zealand they are generally found in the moss and litter of wet rainforest, but they have also been collected from litter at the base of clumps of tussock in grasslands where the humidity level

is also high. Because they are rarely captured alive (almost all specimens in collections were taken in Berlese funnel samples) nothing is known directly of their natural history. The paucity of the silk spigots (there are only three on each spinneret in *H. novaeseelandiae*) would suggest that they do not construct a snare, and the absence of poison glands and the peculiar features of the chelicerae coupled with their minute size would appear to limit the prey they might capture. The only groups of invertebrates occupying the same habitats which appear to fall into the possible prey range are the collembola or acari (unless one goes below this size range to such animals as the tardigrades).

HOLARCHAEA FORSTER

Holarchaea Forster, 1955, p. 392 (type species by original designation *Archaea novaeseelandiae* Forster).

DISCUSSION: At the time the original species was described (in *Archaea*) by Forster (1949), it was noted that the species is quite unlike the other species of the genus in which it was

temporarily placed. Subsequently (Forster, 1955), the species was transferred to the new genus *Holarchaea* but was still retained in the Archaeidae. Since that time, numerous specimens have been collected in New Zealand (from Three Kings Islands in the north to Stewart Island in the south, but not in the subantarctic islands), all of which share with *H. novaeseelandiae* the characters listed above in the family description. More recently, Hickman (1981) described from Tasmania a second species (as *Zearchaea globosa*) that thus extends the range of the family and lends support to the suggestion that these spiders are a relictual group. Because Hickman had only a single female specimen and we have seen only one male from Tasmania (AMNH), it has not been possible to confirm a number of the internal characters in the Tasmanian representatives. As all the external features recorded show very close correspondence to those of the New Zealand representatives (even the male palp differs mainly in the shape of the accessory processes on the proximal segments), there is no reason to suspect that radical differences exist.

THE OTHER PALPIMANOIDS

The primary synapomorphy which we suggest links the Archaeidae, Mecysmauchenidae, Pararchaeidae, and Holarchaeidae is the prolongation of the anterior margin of the carapace to encircle the base of the chelicerae. A second characteristic common to all of these families (except the Holarchaeidae) is the presence of peg teeth on the promargin of the cheliceral furrow, and it is this character (together with the raised cheliceral gland mound) which may provide a clue to the wider relationships of this group of families. The other families which share these cheliceral features are the Palpimanidae, Stenochilidae, Huttoniidae, Tetricellidae, Micropholcommatidae, and Mimetidae. The first three of these families have generally been considered to be closely related to each other, but the relationship of those taxa with the latter three families is a novel, and more tenuous, suggestion. Before enlarging on our proposals regarding the interrelationships of these taxa,

it seems useful to present a brief review of the six families we suggest should be associated with the four archaeid families.

THE PALPIMANIDAE

Figures 260–276, 279–297, 302, 303

The palpimanids are medium-sized spiders. The carapace is always heavily sclerotized, strongly rugose or tuberculate, and suboval in outline, with the head region evenly rounded and sloping gently back to the thoracic region (fig. 269). The fovea is usually distinct but in contrast to the stenochilids is always single (fig. 283). There are eight (fig. 282) or six eyes with the missing pair being the PME (in *Hybosida* Simon). The lateral eyes are contiguous in the Otiiothopinae and Chediminae but widely separated in the Palpimaninae. The chelicerae are short and stout, directed down vertically below the anterior margin of the carapace. The cheliceral furrow